

Claims

What is claimed is:

- 5 1. A tunable power amplifier comprising:
- a power amplifier;
 - a ferro-electric tunable component coupled to the power amplifier;
 - a power amplifier output matching circuit
 - 10 coupled to the power amplifier, having an impedance and comprising the ferro-electric tunable component;
 - a control line operably coupled to the ferro-electric component;
 - 15 a control source electrically coupled to the control line, the control source configured to transmit a control signal on the control line;
 - wherein the ferro-electric component, responsive to the control signal, adjusts the
 - 20 impedance of the matching circuit.
2. The tunable power amplifier of claim 1, wherein the ferro-electric tunable component comprises a ferro-electric tunable capacitor.

3. The tunable power amplifier of claim 2, further comprising a substrate wherein the capacitor is directly mechanically coupled to the substrate and the power amplifier is directly mechanically coupled to the substrate.
4. The tunable power amplifier of claim 3, wherein the output matching circuit further comprises a second ferro-electric tunable component.
5. The tunable power amplifier of claim 4, wherein the second component comprises a tunable ferro-electric capacitor.
6. The tunable power amplifier of claim 1, wherein the matching circuit comprises:
- a first tunable ferro-electric capacitor coupled at a first end of the first capacitor to an output of the power amplifier and to ground at a second end of the first capacitor;
 - an inductive element coupled at a first end of the inductor to the first tunable capacitor and to the power amplifier, and;
 - a second tunable ferro-electric capacitor coupled, at a first end of the second capacitor to

a second end of the inductive element and to
ground at a second end of the second capacitor;

wherein, the ferro-electric component
comprises one of the ferro-electric tunable
capacitors.

7. The tunable power amplifier of claim 6, wherein
the inductive element comprises a lumped element
inductor.

8. The tunable power amplifier of claim 6, wherein
the inductive element comprises a microstrip.

9. The tunable power amplifier of claim 6, further
comprising:

a second inductive element coupled at a first
end of the second inductive element to the second
end of the first inductive element;

a third ferro-electric tunable capacitor
coupled at a first end of the third capacitor to a
second end of the second inductive element and at
a second end of the third capacitor to ground.

10. The tunable power amplifier of claim 9, wherein
the second inductive element comprises a lumped
element inductor.

11. The tunable power amplifier of claim 9, wherein
the second inductive element comprises a
microstrip.

12. A method of tuning an impedance match of a power
5 amplifier comprising:
generating a control signal;
coupling the control signal to a ferro-
electric component;
changing an impedance of the component,
10 responsive to the control signal;
changing the impedance match of the power
amplifier responsive to changing the impedance of
the component.
13. A wireless communication device comprising:
15 a battery;
a transceiver;
a user interface;
a housing encasing the battery and the
transceiver and adapted to present the user
20 interface external to the housing;
a power amplifier;
a ferro-electric tunable component coupled to
the power amplifier;

. . . ;
a power amplifier output matching circuit
coupled to the power amplifier, having an
impedance and comprising the ferro-electric
tunable component;

5 a control signal generator for generating a
control signal;

a control line coupled to the control signal
generator and to the ferro-electric component;

10 a control source electrically coupled to the
control line, the control source configured to
transmit a control signal on the control line;

wherein the ferro-electric component,
responsive to the control signal, adjusts the
impedance of the matching circuit.

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